

Investigation of a L1-optimized Choke Ring Ground Plane for a Low-Cost GPS Receiver-System

Li Zhang and Volker Schwieger (Germany)

Key words: Deformation measurement; Engineering survey; GNSS/GPS; Low cost technology; Positioning; Multipath effect, choke ring

SUMMARY

Besides the geodetic dual-frequency GNSS receivers-systems (receiver and antenna), there are also low-cost single-frequency GPS receiver-systems.

The multipath effect is a limiting factor of accuracy for both geodetic dual-frequency and low-cost single-frequency GPS receivers. And the multipath effect is for the short baselines dominating error (typical for the monitoring in Engineering Geodesy). So accuracy and reliability of GPS measurement for monitoring can be improved by reducing the multipath signal.

In this paper, the self-constructed L1-optimized choke ring ground plane (CR-GP) is applied to reduce the multipath signal. Its design will be described and its performance will be investigated.

The results show that the introduced low-cost single-frequency GPS receiver-system, which contains the Ublox LEA-6T single-frequency GPS receiver and Trimble Bullet III antenna with a self-constructed L1-optimized CR-GP, can reach standard deviations of 3 mm in east, 5 mm in north and 9 mm in height in the test field which has many reflectors. This accuracy is comparable with the geodetic dual-frequency GNSS receiver-system. The improvement of the standard deviation of the measurement using the CR-GP is about 50 % and 35 % compared to the used antenna without shielding and with flat ground plane respectively.

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(8513)
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FIG Working Week 2017
Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017